

Oracle Tuning

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Agenda

- Oracle Database Structure
- Oracle Database Access
- Tuning Considerations
- Oracle Database Tuning
- Oracle Tuning Tools

Oracle Database Structure

Logical Structure

Logical Structure

- Tablespaces
 - SYSTEM
 - RBS or UNDO
 - TEMP
 - User Data and Indices
- Schema
- Tables and Indices
- Segments (Data, Index, RBS, Temp)
- Extents

Physical Structure

Physical Structure

- Database
 - Data
 - Parameter Files
- Instance
 - Processes
 - Memory Structures

Physical Database

- Data Files
- Redo Log Files
- Control Files
- Parameter File
- Archive Log Files

Parameter File

- Read at instance startup
- Specifies values for various system wide parameters
- Size parameters
 - SGA, db buffer, sort area size, ...
- Tuning parameters
- ...

Database Instance

- Processes
 - Process Monitor (PMON)
 - System Monitor (SMON)
 - Database Writer(s) (DBWR_x)
 - Recovery (RECO)
 - Archiver (ARC_x)
 - Checkpoint (CKPT)
 - Log Writer (LGWR)
 - Server Processes
- Memory Structure
 - System Global Area (SGA)
 - Program Global Area (PGA)

Memory Structure

- SGA
 - Database buffer cache
 - Redo log buffer
 - Shared Pool
 - Shared SQL Area
 - PL/SQL Procedures and Packages
 - Dictionary Cache
 - ...
- PGA
 - Heap
 - Sort Area

Oracle Database Access

Database Connection

- Sql*Net
- Listener
- Server Process

Data Access

- Access data via SQL or PL/SQL
- Processing of SQL in three phases:
 - Parse
 - Execute
 - Fetch
- Execution plan depends on the optimizer mode:
 - Role based
 - Cost based

Tuning Considerations

Tuning Considerations

- OLTP vs DSS
- Response Time vs Throughput
- Response Time = Service Time + Wait Time
- Tuning Tradeoffs
 - Affect of tuning on rest of the system
- Frequency of use

Special Tuning Considerations

- Oracle Parallel Server
- Multi-Threaded Server
- Replication
- Distributed Queries

Consider All Options

- Business Rules
- Database Design and Application Design
- System Architecture
- Network: LAN and WAN
- System: Hardware and Operating System
- Application Tuning
- Database Tuning

Oracle Database Tuning

Proactive vs Reactive

- Proactive Tuning

- Balance IO Distribution
- Manage Object Extents
- Manage batch jobs
- Manage long running and poorly tuned queries
- Database parameter review and tuning
- ...

- Reactive Tuning

- React to a trouble report or performance problem

Tuning Steps

- Identify and define the problem
- Set clear and measurable tuning goals
- Take initial performance measurements
- Iteratively apply tuning changes and measure performance on TEST system
- Document ALL tuning changes
- After goal is reached, apply changes to PRODUCTION.

What Is Tunable in Oracle

- File placement
- DB Block Size
- SGA Size
- Listener setup
- Init Parameters
- Table/tablespace mapping
- Table/Index parameters
- RBS/Undo parameters
- Other Features: OPS, Replication, MTS, ...

How to Tune

- SQL Statements
 - Can they be rewritten for better data access?
 - Review Execution plan for use of Indexes
- Resource Contention
 - RBS or Undo
 - CPU
 - Memory
 - IO
 - Network

How to Tune

- RBS or Undo Contention
 - Add more Rollback Segments
 - Change RBS segment size
- CPU Contention
 - Tune SQL
 - Distribute workload to off-peak hours
 - Add more CPU
- Memory Contention
 - Change SGA size
 - Change PGA size
 - Consider Multi-Threaded Server Config

How to Tune

- IO Contention
 - Moving Data files to balance IO
 - Moving Tables to different Tablespace to balance IO
 - Adding/Removing Indexes
 - Change table structures: going to Partitioned tables
 - Maybe consider Tuning SQL
 - Review fragmentation including chained/migrated rows
- Network Contention
 - Adding LAN/WAN resources
 - Modifying Listener configuration
 - Review application design

Oracle Tuning Tools

Oracle Tuning Tools

- Explain Plan
- SQL Trace
 - Session Level
 - System Level
- Dynamic Performance Views

V\$SYSSTAT	V\$SESSSTAT	V\$WAITSTAT
V\$SGASTAT	V\$ROLLSTAT	V\$LATCH
V\$LIBRARYCACHE	V\$SORT_USAGE	V\$SQLAREA

Oracle Tuning Tools

- UTLBSTAT and UTLESTAT
- STATSPACK
- Oracle Enterprise Manager
- Performance Tool Vendors
 - Quest Software
 - Precise
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